

Grand Canyon Ecosystems



What is an Ecosystem? An ecosystem includes all the plants, animals, and non-living parts in an **environment**. Ecologists study the interactions between the living and non-living parts of an ecosystem. Can you think of some living and non-living parts of your environment? How do they interact?

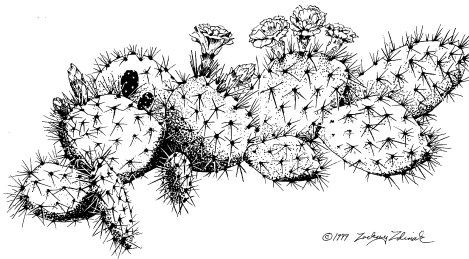
Cool Canyon Facts

River length: 277 miles
Average canyon width: 10 miles
Canyon depth: about 1 mile
Plants: more than 1,750 species
Fish: 17 species
Amphibians and Reptiles:
57 species
Mammals: 91 species
Birds: 373 species
Insects: 8,480 known species

Think About It

CAN YOU DEFINE ECOSYSTEM?

Adaptations are special characteristics or behaviors of plants and animals that help them survive.



What **adaptation** does a cactus have that keeps animals away?

Vocabulary:

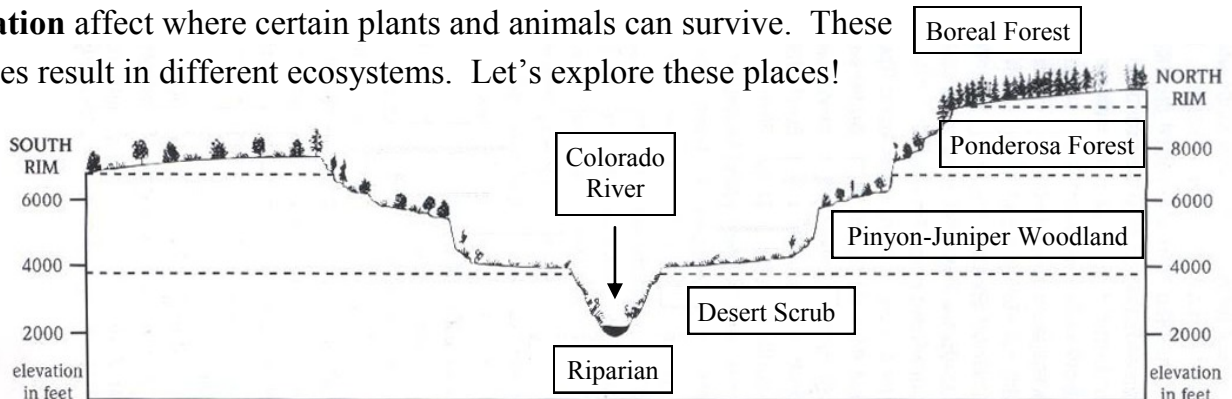
Biodiversity: variety of plants and animals in an ecosystem.

Environment: all the living and non-living things that affect an organism where it lives.

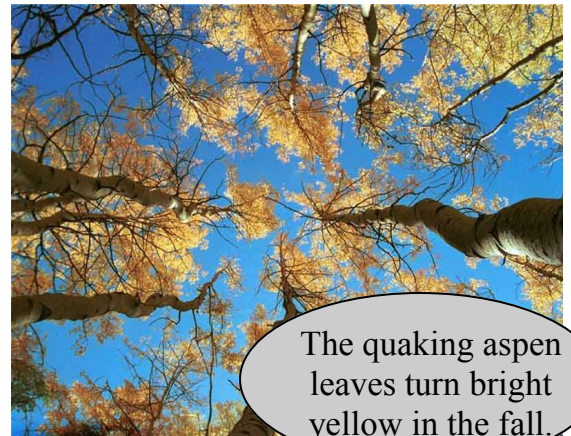
Precipitation: forms of water falling from the sky, such as rain, hail, and snow.

From Rim to River

Grand Canyon National Park has five different ecosystems. If you hike from the canyon rim to the Colorado River, you see ecosystems that can be found from Canada to Mexico. What makes these ecosystems so different from each other? Elevation, temperature, and the amount of **precipitation** affect where certain plants and animals can survive. These differences result in different ecosystems. Let's explore these places!

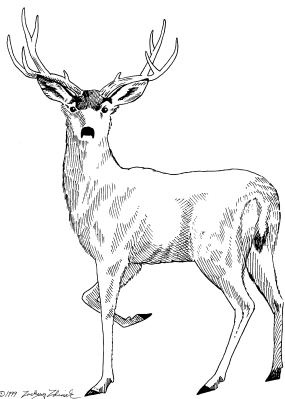


The **Boreal Forest** ecosystem at Grand Canyon is found only on the North Rim, between 9,200 to 8,200 feet in elevation. The boreal forest receives the most rain and snow of any area in Grand Canyon. About 26 inches of precipitation fall every year. On average, 10 to 12 feet of snow fall in the Boreal Forest, closing the North Rim of the park to visitors during the winter months. The dominant plants in this ecosystem are quaking aspen and tall evergreen trees, such as Engelmann spruce and Douglas fir.



The quaking aspen leaves turn bright yellow in the fall.

The boreal forest is named after Boreas, god of the north wind. Intense storms blow through the thick, shaded forests of the North Rim. Fall winds rustle the tree branches of the quaking aspen until the ground is littered with leaves. The long-tailed vole scurries along the forest floor, keeping constant watch to avoid its predators. Snow falls through the tall trees and covers the ground for six or seven months of the year. Squirrels are adapted to survive the long cold winters. They must collect and store seeds to survive. Even the mule deer will move down to lower, warmer elevations. As spring arrives, melting snow creates lakes in the open meadows. As temperatures get warmer and the snow melts, water will flow into the canyon for other plants and animals to use.

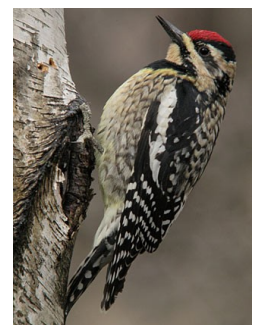


The **Ponderosa Pine Forest** ecosystem is found on the North and South Rims of Grand Canyon. This forest is found from 8,200 to 7,000 feet in elevation and receives about 16 inches of precipitation every year. About five feet of snow fall here each winter. Summer thunderstorms produce lightning and heavy rains.



Ponderosa Pines can grow to be 500 years old!

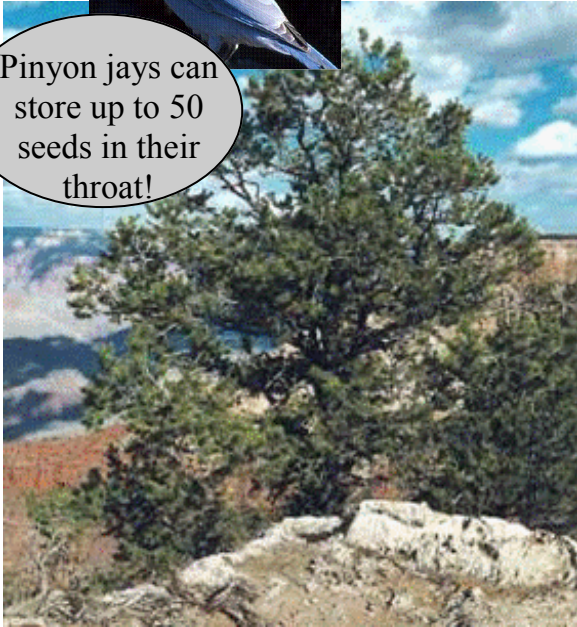
The dominant plant in this ecosystem is the ponderosa pine tree. Below these giant trees, which can be 125 feet tall, needles litter the open forest floor. Wildflowers like the lupine also thrive here. During an intense thunderstorm, lightning may strike a ponderosa pine, leaving a scar the entire length of its trunk. Sap will ooze out of the tree's scar, giving the sapsucker woodpecker a tasty treat. Forest fires caused by lightning are common in this ecosystem. The ponderosa pine has a special adaptation to protect itself from fire. Its bark can be up to four inches thick! Step closer to smell the bark of these trees and you will notice the strong scent of vanilla. Squirrels can be seen running across the forest floor, eating pine cones in the trees, and keeping constant watch for birds of prey.



The **Pinyon-Juniper Woodland** ecosystem is found in sunny locations on and below the South and North rims of Grand Canyon from 7,300 feet to 4,000 feet in elevation. The pinyon-juniper



Pinyon jays can store up to 50 seeds in their throat!



woodland gets between 7 and 15 inches of precipitation each year. The pinyon pine and Utah juniper are the dominant

plants found in this woodland environment. At night bobcats prowl the forest, hunting for mice and desert cottontails. Stay clear of the striped skunk as it munches on nuts and berries.



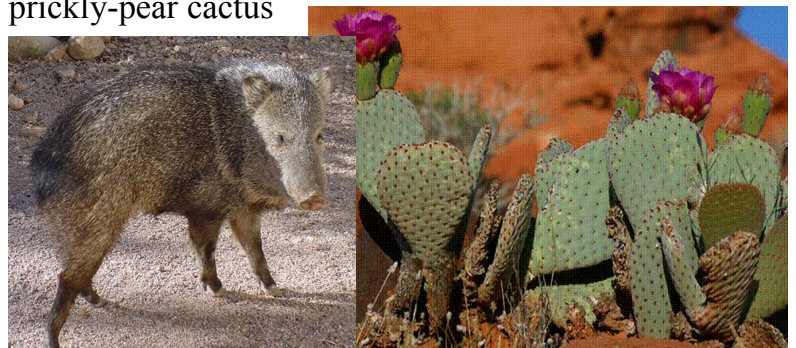
The trees here are extremely drought resistant and have special scale-like leaves or needles that are adapted to long periods without rain. Some people call this a pygmy or dwarf woodland, because these trees only grow 20 to 40 feet tall. Within the canyon these trees provide some of the only shade when temperatures reach over 90 degrees Fahrenheit.



Often mistaken as an insect, scorpions have 8 legs, making them an arachnid.

The **Desert Scrub** ecosystem is found at the lowest elevations in Grand Canyon. From 4,500 feet down to 1,200 feet in elevation, the desert scrub ecosystem only receives 7 inches of precipitation each year. The dominant plants in this ecosystem are short scrubby bushes like Mormon tea, cacti like the beavertail cactus, or the small, spiky banana yucca. Don't be fooled, these small plants can be more than one hundred years old!

This is the hottest, driest ecosystem found at Grand Canyon. During the summer months, temperatures often reach over 100 degrees Fahrenheit. If you look closely, you may see lizards running quickly between patches of shade. The unpredictable rainfall and lack of permanent water requires creatures to adapt to extreme conditions. The Sacred Datura plant blooms at night to attract hawk moths, the only insect that pollinates them. Animals such as bighorn sheep have adapted to living in a desert environment with little or no water; they may go for days or weeks without drinking water. The prickly-pear cactus has thick pads and stems that hold or retain water after it rains. Sharp, painful spines protect and defend the cactus from many water-seeking animals. These spines, however, don't bother the javelina's tough snout as they munch on the tasty cactus pads.



The **Riparian** ecosystem is different from the other ecosystems in that it is not dependent on elevation or precipitation. Instead, riparian ecosystems are found anywhere there is a creek, pond, spring, or other permanent, year-round water supply. A good example of a riparian ecosystem is found along the Colorado River at the bottom of Grand Canyon. Smaller springs and streams can be found throughout all of Grand Canyon's other ecosystems. Cottonwood trees need a constant supply of water, so if you see them you know water is near.

The word riparian comes from the Latin word *ripa*, which means river bank.



Riparian zones are lush, vegetated areas that surround permanent water sources. Although they are rare at Grand Canyon, they have the highest diversity of plants and animals. This is the smallest ecosystem at Grand Canyon, but supports the greatest **biodiversity**. Some animals, like the canyon tree frog, can only be found in riparian ecosystems. Many other animals, like the ringtail and skunk, rely on riparian ecosystems for food, water, and shelter.

Grand Canyon
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Label the ecosystems in the order you would find them when hiking from the North Rim to the Colorado River. Unscramble the circled letters to answer the question at the bottom.

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Does the temperature get warmer or colder as you go down in elevation?

The temperature gets _____.

Put a star next to the coldest ecosystem at Grand Canyon!